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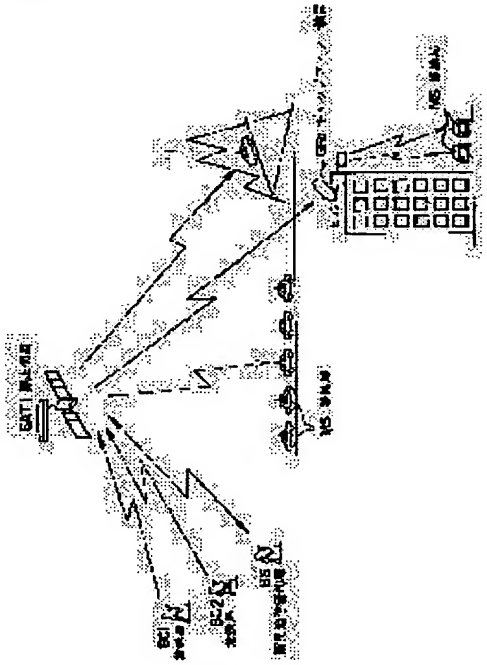
(54) SATELLITE BROADCASTING SYSTEM AND ITS GAP FILLER DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To permit not only a fixed station but also a moving station to securely receive a signal without providing a large equipment in a dead zone where radio signals from a satellite cannot directly be received.
SOLUTION: A gap filler device GFa is installed on the roof of a building. The gap filler device GFa receives and amplifies a broadcasting signal transmitted from a geostationary satellite SAT1 and relays/transmits the received broadcasting signal to the dead area at a frequency equal to that of the broadcasting signal from the geostationary satellite SAT1 by using a directional antenna.



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* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The satellite broadcasting service system [claim 2] characterized by to provide the gap filler equipment which receives the broadcast signal relayed in said satellite in the satellite broadcasting service system which relays with a satellite the broadcast signal which a ground broadcasting station transmitted, and broadcasts to a terrestrial predetermined service area, and carries out the wireless transmission of this reception broadcast signal on the same frequency as the broadcast signal to which it is transmitted from said satellite in said service area to the area which cannot receive the broadcast signal from said satellite Said gap filler equipment is a satellite broadcasting service system according to claim 1 characterized by having a directional antenna, giving directivity and carrying out wireless transmission of said reception broadcast signal with this directional antenna to the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 3] It is the satellite broadcasting service system according to claim 2 characterized by for said gap filler equipment giving directivity in the direction of east and west for said reception broadcast signal when said satellite is a geostationary satellite arranged in the geostationary orbit of the equatorial sky, and carrying out wireless transmission.
[Claim 4] It is the satellite broadcasting service system characterized by for either [at least] said ground broadcasting station or said satellite to have a modulation means carries out the spread-spectrum modulation of the broadcast signal with a predetermined diffusion sign, and transmit, and for said gap filler equipment to receive the broadcast signal which was transmitted from said satellite, and by which a spread-spectrum modulation was carried out, and to carry out the wireless transmission of this broadcast signal that received towards the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 5] In the gap filler equipment used by the satellite broadcasting service system which transmits a broadcast signal to a terrestrial predetermined service area through a satellite The 1st antenna for receiving the broadcast signal transmitted from said satellite, The wireless circuit section for outputting the transmitting broadcast signal which amplifies at least the broadcast signal received by this 1st antenna, and consists of the same frequency as the reception broadcast signal concerned, Gap filler equipment characterized by providing the 2nd antenna for carrying out wireless transmission of the transmitting broadcast signal outputted from this wireless circuit section to the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 6] It is gap filler equipment according to claim 5 characterized by being what said 2nd antenna gives directivity in the direction of east and west for a transmitting broadcast signal when said satellite is a geostationary satellite arranged in the geostationary orbit of the equatorial sky, and carries out wireless transmission.
[Claim 7] The 1st satellite which turns to a terrestrial predetermined service area the broadcast signal which has been arranged on a predetermined orbit and sent from the ground broadcasting station, and is transmitted, The satellite broadcasting service system characterized by providing the 2nd satellite which takes a synchronization mutually and transmits the same broadcast signal as the broadcast signal which a predetermined distance is separated, it is arranged on the same orbit as this 1st satellite, and said 1st satellite transmits towards said service area.
[Claim 8] The satellite broadcasting service system according to claim 7 characterized by using the command support aircraft of the 1st satellite for said 2nd satellite.
[Claim 9] [the satellite for relaying the broadcast signal transmitted from the ground broadcasting station, and transmitting to a terrestrial predetermined service area, and in said service area] Two or more broadcast receiving sets which had the function which receives the broadcast signal relayed by said satellite, and is reproduced, The gap filler equipment which receives the broadcast signal relayed by said satellite, and transmits this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area is provided. It has the conversion means which said satellite changes the broadcast signal transmitted from the ground broadcasting station into the 1st and 2nd broadcast signals with which frequencies differ mutually, and carries out wireless transmission, respectively. A means for said gap filler equipment to receive the 2nd broadcast signal transmitted from said satellite, and to change this 2nd broadcast signal into the 3rd broadcast signal of the same frequency as said 1st broadcast signal, The satellite broadcasting service system characterized by having the means which turns this 3rd broadcast signal to the area which cannot receive the 1st broadcast signal from said satellite in said service area, and carries out wireless transmission.
[Claim 10] Said broadcast receiving set is a satellite broadcasting service system according to claim 9 characterized by having further a means to receive, respectively and to compound said 1st broadcast signal and the 3rd broadcast

signal.
[Claim 11] The conversion means of said satellite is a satellite broadcasting service system according to claim 9 characterized by transmitting said 2nd broadcast signal as a signal for said gap filler equipments while changing into the 2nd broadcast signal of a RF region the broadcast signal transmitted from the ground broadcasting station from the 1st broadcast signal and S band of S band and transmitting the 1st broadcast signal as a signal for said broadcast receiving sets.
[Claim 12] In the satellite broadcasting service system which relays in a satellite the broadcast signal which the ground broadcasting station transmitted, and is transmitted to a terrestrial predetermined service area A ground network transmission means to transmit the 2nd broadcast signal of the contents as the 1st broadcast signal which transmits towards said satellite with said same ground broadcasting station through a ground network, Receive the 2nd broadcast signal transmitted by this ground network transmission means, and this 2nd broadcast signal that received is changed into the 3rd broadcast signal of the same frequency band as the broadcast signal which said satellite transmits. The satellite broadcasting service system characterized by providing the gap filler equipment which turns this 3rd broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area, and carries out wireless transmission.
[Claim 13] In the gap filler equipment used by the satellite broadcasting service system which relays in a satellite the broadcast signal which the ground broadcasting station transmitted, and is transmitted to a terrestrial predetermined service area The ground network receiving means for receiving the 2nd broadcast signal of the contents as the broadcast signal transmitted towards said satellite with said same ground broadcasting station from said ground broadcasting station through a ground network, A conversion means to change the 2nd broadcast signal received by this ground network receiving means into the 3rd broadcast signal of the same frequency band as the broadcast signal which said satellite transmits, Gap filler equipment characterized by providing the transmitting means which turns the 3rd broadcast signal obtained by this conversion means to the area which cannot receive the broadcast signal from said satellite in said service area, and carries out wireless transmission.
[Claim 14] In the gap filler equipment used by the satellite broadcasting service system which relays in a satellite the broadcast signal which the ground broadcasting station transmitted, and is transmitted to a terrestrial predetermined service area The satellite receiving means for receiving the broadcast signal transmitted from said satellite, The ground network receiving means for receiving the 2nd broadcast signal of the contents as the broadcast signal transmitted towards said satellite with said same ground broadcasting station through a ground network, The conversion means for changing the 2nd broadcast signal received by this ground network receiving means into the 3rd broadcast signal of the same frequency band as the broadcast signal to which it is transmitted from said satellite, Either the broadcast signal received by said satellite receiving means or the 3rd broadcast signal obtained by said conversion means is chosen. Gap filler equipment characterized by providing the selection transmitting means which carries out wireless transmission towards the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 15] Said selection transmitting means judges whether the broadcast signal more than predetermined level is received by the satellite receiving means. Choose the broadcast signal received by the satellite receiving means when judged with being received, and wireless transmission is carried out to said non-receipt area. Gap filler equipment according to claim 14 characterized by turning to said non-receipt area the 3rd broadcast signal obtained by said conversion means when judged with on the other hand not being received, and carrying out wireless transmission.
[Claim 16] In the satellite broadcasting service system which relays a broadcast signal with a satellite and is broadcast to a terrestrial predetermined service area The gap filler equipment which receives the broadcast signal relayed in said satellite, and carries out wireless transmission of this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area, The supervisory equipment connected through a communication line to this gap filler equipment is provided. Said gap filler equipment It has a monitor information transmitting means to generate the monitor information showing the operating state of self-equipment, and to transmit this monitor information to said supervisory equipment through said communication line. Said supervisory equipment The satellite broadcasting service system characterized by having a means to perform predetermined processing for receiving the monitor information transmitted through said communication line from said gap filler equipment, and supervising the operating state of said gap filler equipment based on this received monitor information.
[Claim 17] Said supervisory equipment is periodical or a satellite broadcasting service system according to claim 16 which is equipped with a means transmit the Request to Send of monitor information to said gap filler equipment through said communication line at the time of the need, and is characterized by to equip the monitor information transmitting means of said gap filler equipment with a means accumulate monitor information, and a means read said monitor information whenever a Request to Send comes from said supervisory equipment, and transmit to supervisory equipment.
[Claim 18] The monitor information transmitting means of said gap filler equipment is a satellite broadcasting service system according to claim 16 characterized by having a means to transmit the monitor information which expresses those contents when it is detected that abnormalities occurred in the operating state of self-equipment with a means to supervise the operating state of self-equipment, and this means to said supervisory equipment through a communication line.
[Claim 19] The monitor information transmitting means of said gap filler equipment is the satellite broadcasting service system according to claim 16 characterized by to have a means transmit towards the broadcast receiving

set of the area where the message information on to that effect is generated, and self-equipment covers this message information when it is detected that abnormalities occurred in the operating state of self-equipment with a means supervise the operating state of self-equipment, and this means.

[Claim 20] In the satellite broadcasting service system which relays a broadcast signal with a satellite and is broadcast to a terrestrial predetermined service area The gap filler equipment which receives the broadcast signal relayed in said satellite, and carries out wireless transmission of this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area, The receiving set for monitors with the function to receive the reception broadcast signal which was installed in said non-receipt area and transmitted from said gap filler equipment, The supervisory equipment connected through the communication line to this receiving set for monitors is provided. Said gap filler equipment The monitor information showing the operating state of self-equipment is generated, and this monitor information is included in said reception broadcast signal, and it has the means which carries out wireless transmission. Said receiving set for monitors A means to receive the reception broadcast signal transmitted from said gap filler equipment, and to extract said monitor information from the inside, It has a means to detect the receive state of said reception broadcast signal, and a means to transmit said extracted monitor information and the detection information on said receive state to said supervisory equipment through said communication line. Said supervisory equipment receives the monitor information and detection information which were transmitted through said communication line from said receiving set for monitors. The satellite broadcasting service system characterized by having a means to perform predetermined processing for supervising the operating state of said gap filler equipment based on this monitor information and detection information that were received.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the satellite broadcasting service system equipped with the gap filler function to enable it to receive information certainly also in the area which becomes shades, such as a crest and a building, especially, and its gap filler equipment, with respect to the system which transmits information towards a terrestrial service area using a broadcasting satellite or a communication satellite.
[0002]
[Description of the Prior Art] In recent years, various communication system is developed with increase of communication link needs, and development of communication technology, and there is a satellite broadcasting service system which used the broadcasting satellite and the communication satellite into it. Even if the advantage of a satellite broadcasting service system does not fix a large-scale infrastructure on the ground, it is being able to offer information broadcast service to a wide range service area.
[0003] By the way, the cure to the building shade which cannot receive the direct wave from a satellite is in one of the technical problems of this kind of system. On the other hand, the big common antenna of aperture is installed, for example in the roof and the steel tower of a skyscraper, and this common antenna receives the radio signal from a satellite, and he amplifies, and is trying to distribute this receiving radio signal to the receiving set of each user of building shade through a coaxial cable or an optical cable in the former. If it does in this way, users, such as building shade which cannot receive the radio signal from a satellite, cannot leak the transmission information from a satellite, either, and can receive it.
[0004]
[Problem(s) to be Solved by the Invention] However, in order for such a community reception facility not to have to leak to each user who is applicable and to have to lay a cable, large-scale construction and costs are needed. Moreover, transmitting information also not only to a fixed station but to a mobile station recently using a satellite broadcasting service system is advocated. In this case, if the user who is in building shade is a fixed station, it is possible to make the community reception facility described previously receive the information from a satellite. However, since neither a coaxial cable nor an optical cable can be laid to the mobile station included in building shade, information from a satellite cannot be made to receive but it is anxious for the cure.
[0005] it **s for this invention to offer the satellite broadcasting service system which was made paying attention to the above-mentioned situation, and it enables it to make receive certainly the place made into that purpose also not only to a fixed station but to a mobile station in area, such as building shade which cannot carry out direct reception of the radio signal from a satellite, without forming a large-scale facility, and can realize a cheap and effective gap filler by this, and its gap filler equipment -- .
[0006]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the satellite broadcasting service system of this invention receives the broadcast signal relayed in the satellite, and is equipped with the gap filler equipment which carries out wireless transmission of this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area.
[0007] After being received by gap filler equipment, by doing in this way, it retransmits a message to the radio signal from a satellite by wireless to building shade etc. For this reason, since it is necessary to lay neither a coaxial cable nor an optical cable to each user of building shade, it is cheaply [comparatively simply and] realizable. Moreover, it becomes possible to make the information from a satellite receive also not only to a fixed station but to a mobile station in building shade etc. Furthermore, since a radio signal is transmitted on the same frequency from gap filler equipment, the radio signal from gap filler equipment can also receive a user only by having the receiving set which receives the direct wave from a satellite.
[0008] Moreover, said gap filler equipment is characterized by giving directivity and carrying out wireless transmission of the reception broadcast signal with a directional antenna, to the area which cannot receive the broadcast signal from a satellite in the above-mentioned service area. By doing in this way, the user of the area which can carry out direct reception of the radio signal from a satellite can reduce the fault which receives interference by the radio signal to which it retransmitted a message from gap filler equipment.
[0009] Moreover, when a satellite is a geostationary satellite arranged in the geostationary orbit of the equatorial sky, it is good to give directivity in the direction of east and west, and to carry out wireless transmission of gap filler equipment to the reception broadcast signal. When a radio signal is transmitted from the geostationary satellite

generally arranged in the geostationary orbit of the equatorial sky, in the ground, shade of an electric wave is made on the north side of obstructions, such as a building. For this reason, in the area where many buildings are located in a line, for example like a street lined with office buildings or shopping quarter, if directivity is given in the direction of east and west from gap filler equipment and a radio signal is broadcast again, it will become possible to cover effectively the shade of the north side of a street lined with large buildings.

[0010] Moreover, the spread-spectrum modulation of the broadcast signal carries out with a predetermined diffusion sign, it transmits, the broadcast signal which was transmitted from the above-mentioned satellite in gap filler equipment and by which the spread-spectrum modulation was carried out receives, and also carrying out wireless transmission towards the area which cannot receive the broadcast signal from the above-mentioned satellite in the above-mentioned service area is carrying out this broadcast signal that received as the description in either [at least] a ground broadcasting station or said satellite.

[0011] A fear of the direct broadcast signal transmitted from the satellite and the relay broadcast signal which gap filler equipment transmitted causing interference by doing in this way disappears. For this reason, even if it is the receiving set which exists near the boundary of the area which can receive the direct broadcast signal from a satellite, and the area which can receive the relay broadcast signal from gap filler equipment, receiving quality can be held highly, without being influenced of interference.

[0012] The 1st antenna for the gap filler equipment of this invention to, receive the broadcast signal transmitted from the satellite on the other hand, The wireless circuit section for outputting the transmitting broadcast signal which amplifies at least the broadcast signal received by this 1st antenna, and consists of the same frequency as the reception broadcast signal concerned, It is characterized by providing the 2nd antenna for carrying out wireless transmission of the transmitting broadcast signal outputted from this wireless circuit section to the area which cannot receive the broadcast signal from said satellite in said service area.

[0013] The information from a satellite can be made to be able to receive comparatively simply and cheaply, without laying a coaxial cable and an optical cable to each user of building shade, as stated previously, and, moreover, the information from a satellite can be made to receive also not only to a fixed station but to a mobile station by using such gap filler equipment. Furthermore, since the relay broadcast signal transmitted to building shade is transmitted on the same frequency as the direct broadcast signal from a satellite, a user can also receive the relay broadcast signal from gap filler equipment only by having the receiving set which receives the direct wave from a satellite.

[0014] Moreover, on the same satellite's orbit, other satellite broadcasting service systems of this invention separate a predetermined distance, arrange the 1st and 2nd satellites, to the same service area, take a synchronization and transmit the same broadcast signal mutually from these 1st and 2nd satellites.

[0015] By doing in this way, the same broadcast signal will be sent to the user in a service area from two satellites with which locations differ. For this reason, it becomes possible, for example to receive the broadcast signal from the satellite of another side also in the office which exists in the area which cannot carry out direct reception of the broadcast signal from one satellite like building shade, and the same effectiveness as the case where the gap filler equipment which this described previously as a result is formed can be done so.

[0016] Moreover, when the command support aircraft is arranged on the same orbit, this command support aircraft is used as the 2nd satellite. If it does in this way, it is not necessary to launch a satellite new for cures, such as building shade, and a cheap system can be offered.

[0017] Furthermore, the satellite broadcasting service system of this invention changes the broadcast signal transmitted from the ground broadcasting station into the 1st and 2nd broadcast signals with which frequencies differ mutually in a satellite, and it is made to carry out wireless transmission, respectively. Gap filler equipment receives the 2nd broadcast signal transmitted from the above-mentioned satellite, and changes this 2nd broadcast signal into the 3rd broadcast signal of the same frequency as said 1st broadcast signal. It is characterized by turning this 3rd broadcast signal to the area which cannot receive the 1st broadcast signal from the above-mentioned satellite in a service area, and carrying out wireless transmission.

[0018] By doing in this way, with gap filler equipment, since the frequencies of the 2nd broadcast signal which receives from a satellite, and the 3rd broadcast signal which self-equipment transmits will differ, the surroundings lump by the received wave of a transmission wave can be prevented easily.

[0019] Furthermore, it is good to give a means to receive, respectively and to compound the 3rd broadcast signal which the 1st broadcast signal and gap filler equipment which were transmitted from the satellite transmitted to a broadcast receiving set. If it does in this way, when it exists in the location which can receive both the 1st broadcast signal from a satellite, and the 3rd broadcast signal from gap filler equipment, with a broadcast receiving set, it will become more receivable [high quality].

[0020] Furthermore, in the conversion means of the above-mentioned satellite, while changing into the 2nd broadcast signal of a RF region the broadcast signal transmitted from the ground broadcasting station from the 1st broadcast signal and S band of S band and transmitting the 1st broadcast signal as a signal for said broadcast receiving sets, it is good to transmit said 2nd broadcast signal as a signal for said gap filler equipments.

[0021] Since what is necessary is just to receive the broadcast signal of S band in a broadcast receiving set if it does in this way, it becomes possible to receive with a simple facility, without using large-sized antennas, such as a parabolic antenna. For this reason, a broadcast receiving set small [a user] and cheap can be used, and it becomes possible to receive broadcast with a cheap facility moreover, without sacrificing portability. On the other hand, with gap filler equipment, since Ku or the broadcast signal of a Ka band will be received, for example, the reception facility which has a parabolic antenna is needed, the frequency-conversion function from a Ka band to Ku or S band

is further needed, but since gap filler equipment is some facilities of a system, it does not become a user's burden and does not pose a big problem.
[0022] A ground network transmission means to transmit the 2nd broadcast signal of the contents as the 1st broadcast signal which transmits towards a satellite with the ground broadcasting station same [the satellite broadcasting service system of this invention] through a ground network furthermore, Receive the 2nd broadcast signal transmitted by this ground network transmission means, and this 2nd broadcast signal that received is changed into the 3rd broadcast signal of the same frequency band as the broadcast signal which said satellite transmits. It is characterized by having gap filler equipment which turns this 3rd broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area, and carries out wireless transmission.
[0023] Moreover, the ground network receiving means for receiving the 2nd broadcast signal of the contents as the broadcast signal transmitted towards said satellite with the ground broadcasting station same [the gap filler equipment of this invention] from said ground broadcasting station through a ground network, A conversion means to change the 2nd broadcast signal received by this ground network receiving means into the 3rd broadcast signal of the same frequency band as the broadcast signal which said satellite transmits, It is characterized by having the transmitting means which turns the 3rd broadcast signal obtained by this conversion means to the area which cannot receive the broadcast signal from said satellite in said service area, and carries out wireless transmission.
[0024] By using such a system and gap filler equipment, even when it cannot install in the location which can receive the direct broadcast signal from a satellite for gap filler equipment according to a site condition etc., the insensible area which cannot carry out direct reception of the broadcast signal from a satellite can certainly be covered.
[0025] Furthermore, the satellite receiving means for receiving the broadcast signal to which gap filler equipment was transmitted from the satellite, The ground network receiving means for receiving the 2nd broadcast signal of the contents as the broadcast signal transmitted towards said satellite with the same ground broadcasting station through a ground network, The conversion means for changing the 2nd broadcast signal received by this ground network receiving means into the 3rd broadcast signal of the same frequency band as the broadcast signal to which it is transmitted from said satellite, Either the broadcast signal received by said satellite receiving means or the 3rd broadcast signal obtained by said conversion means is chosen, and it constitutes so that it may have the selection transmitting means which carries out wireless transmission towards the area which cannot receive the broadcast signal from said satellite in said service area.
[0026] If it does in this way, the function which receives the broadcast signal from a satellite and carries out junction transmission, and the function which receive the broadcast signal sent through the ground network, and carries out junction transmission can give one gap filler equipment, respectively, and each above-mentioned function can use alternatively according to the installation conditions of gap filler equipment only at this preparing one gap filler equipment.
[0027] Moreover, it judges whether in the above-mentioned selection transmitting means, the broadcast signal more than predetermined level is received by the satellite receiving means, the broadcast signal received by the satellite receiving means when judged with being received chooses, wireless transmission carries out to said non-receipt area, when judged with on the other hand not being received, the 3rd broadcast signal obtained by said conversion means turns to said non-receipt area, and wireless transmission carries out.
[0028] If it does in this way, according to the ability of the direct reception of the broadcast signal from a satellite to be carried out, each function can be chosen automatically and the activity of a maintenance setup etc. can be done easy.
[0029] Moreover, the satellite broadcasting service system of this invention is added to gap filler equipment. The supervisory equipment connected through a communication line to this gap filler equipment is provided. It has a monitor information transmitting means to generate the monitor information which expresses the operating state of self-equipment with the above-mentioned gap filler equipment, and to transmit this monitor information to said supervisory equipment through said communication line. And it is characterized by equipping supervisory equipment with a means to perform predetermined processing for receiving the monitor information transmitted through the communication line from the above-mentioned gap filler equipment, and supervising the operating state of the above-mentioned gap filler equipment based on this received monitor information.
[0030] With such a system, it becomes possible to carry out the centralized control of the operating state of gap filler equipment for example, in a monitor center, and, thereby, a prompt action is attained to a failure.
[0031] The following can be considered as a monitor method of the above-mentioned monitor information. That is, the 1st method is periodical or a thing which transmits the Request to Send of monitor information to gap filler equipment through a communication line at the time of the need, reads the monitor information by which the pre-above-mentioned are recording was carried out whenever it accumulates monitor information in gap filler equipment and the Request to Send came from the above-mentioned supervisory equipment, and transmits to supervisory equipment from supervisory equipment. If it is this method, even when a large number [gap filler equipment], the monitor information on these gap filler equipments can be efficiently collected in the monitor center.
[0032] Moreover, in gap filler equipment, the 2nd method supervises the operating state of self-equipment, and when it is detected that abnormalities occurred in the operating state of self-equipment, it transmits the monitor information showing the contents to supervisory equipment through a communication line. According to this method, when a failure occurs with gap filler equipment, that information can be notified to a monitor center instancy.
[0033] When it is detected that abnormalities occurred in the operating state of self-equipment in gap filler

equipment, you may make it transmit towards the broadcast receiving set of the area where the message information on to that effect is generated, and self-equipment covers this message information furthermore. If it does in this way, when it became impossible for gap filler equipment to receive the broadcast signal from a satellite, or when it becomes impossible to broadcast live by a failure occurring to self-equipment, a message to that effect can be transmitted and displayed on a broadcast receiving set. As a result, a user can know clearly the reason whose reception is impossible.

[0034] Furthermore, in addition to gap filler equipment, the satellite broadcasting service system of this invention possesses the receiving set for monitors with the function to receive the reception broadcast signal transmitted from gap filler equipment into non-receipt area, and the supervisory equipment connected through the communication line to this receiving set for monitors. In gap filler equipment, the monitor information showing the operating state of self-equipment is generated, this monitor information is included in a reception broadcast signal, and wireless transmission is carried out. And in the receiving set for monitors While receiving the relay broadcast signal transmitted from the above-mentioned gap filler equipment and extracting monitor information from the inside The receive state of the above-mentioned relay broadcast signal is detected, and the detection information and the monitor information by which the extract was carried out [above-mentioned] on this receive state are transmitted to supervisory equipment through a communication line. Supervisory equipment The monitor information and detection information which were transmitted through the communication line from the receiving set for monitors are received, and it is characterized by performing predetermined processing for supervising the operating state of gap filler equipment based on this monitor information and detection information that were received.

[0035] With such a system, the receive state of the broadcast signal from gap filler equipment can be directly observed by installing the receiving set for monitors in the location of the arbitration of insensible area, and this observation can be sent to a monitor center with the monitor information which gap filler equipment itself transmitted. For this reason, the monitor based more on the actual condition can be performed.

[0036]

[Embodiment of the Invention]

(1st operation gestalt) This satellite broadcasting service system is equipped with two or more ground broadcasting stations (VSAT) BC1 and BC2 or the feeder link station, and a geostationary satellite SAT 1 and the satellite-tracking control station STCC.

[0037] The ground broadcasting stations (VSAT) BC1 and BC2 or a feeder link station transmits the program information created and edited by each broadcast entrepreneur to a geostationary satellite SAT 1 through the going-up transmission line of a Ka band (26.5-40GHz) or a Ku band (12.5-18GHz).

[0038] The geostationary satellite SAT 1 is equipped with the Ka band which has 2.5m class aperture or the antenna for Ku bands, and the antenna for S bands (for example, 2.6GHz) which has 15m class aperture. And after receiving and amplifying the broadcast signal by which multiplex transmission was carried out from each above-mentioned broadcasting stations (VSAT) BC1 and BC2 or a feeder link station with Above Ka or the antenna for Ku bands, it is changed into the signal of S band. And S band gets down from the above-mentioned antenna for S bands, and this changed broadcast signal is transmitted towards a service area through a transmission line. In addition, the aperture of the antenna for uphill transmission carried in the above-mentioned geostationary satellite SAT 1 may be smaller than 2.5m class, and may be not only 15m class but 8m class also about the aperture of the antenna for S bands.

[0039] In addition, the satellite-tracking control station STCC supervises and controls the operating state of a geostationary satellite SAT 1.

[0040] In a service area, the broadcast signal with which S band got off the above-mentioned geostationary satellite SAT 1, and the broadcast receiving set (not shown) installed, for example in office or a home fixed and the movable broadcast receiving set MS of mount or a pocket mold were transmitted to the transmission line is received. In addition, the above-mentioned S band gets down and a maximum of two or more 900 channels which have the transmission speed of 64 - 256Kbps/a channel are multiplexed in a transmission line. Moreover, when transmitting a video signal by each channel, MPEG4 (moving picture experts group 4) is used as an image coding method.

[0041] By the way, in the system of this 1st operation gestalt, gap filler equipment GFa is installed in the roof of a skyscraper etc. Gap filler equipment GFa is broadcast again towards area, such as building shade which cannot receive the broadcast signal from the above-mentioned geostationary satellite SAT 1, holding the same frequency for this received broadcast signal, after receiving and amplifying the broadcast signal from a geostationary satellite SAT 1, and is constituted as follows.

[0042] Drawing 2 is the circuit block diagram showing the configuration. That is, the broadcast signal transmitted from the geostationary satellite SAT 1 is amplified with a low noise amplifier 13, after it is inputted into the input filter 12 after being received by the receiving antenna 11, and only a predetermined transmission band is chosen here. And after this amplified broadcast signal is amplified with power amplifier 14 and is further band-limited to a predetermined transmission band by the output filter 15, it is transmitted towards the insensible area which the direct wave from the geostationary satellites SAT 1, such as building shade, does not reach from the transmitting antenna 16. Here, the directional antenna was used for the above-mentioned output antenna 16, and this limits the transmission data length of the above-mentioned broadcast signal to the insensible area which the direct wave from the above-mentioned geostationary satellite SAT 1 cannot receive.

[0043] Since it is such a configuration, S band gets off this geostationary satellite SAT 1, it is transmitted towards a service area through a transmission line, and the broadcast signal transmitted from two or more broadcasting stations BC1 and BC2 or feeder link stations is received by the broadcast receiving set MS which exists in a

service area, after being sent to a geostationary satellite SAT 1 through Ka or the going-up transmission line of a Ku band. Since it has the property in which the antenna for S bands of the 15m class diameter of macrostomia is carried in the geostationary satellite SAT 1, and S band moreover cannot be easily influenced of rainfall attenuation, at this time, a broadcast signal is received by each broadcast receiving set MS with received field strength big enough. For this reason, it is ability ready for receiving about a broadcast signal by using a small rod antenna and a small flat antenna in the broadcast receiving set MS.

[0044] However, in the broadcast receiving set MS which exists in the insensible area which cannot receive the direct wave from a geostationary satellite SAT 1 like building shade, the above-mentioned broadcast signal is directly unreceivable. However, after being received in gap filler equipment GFa, junction transmission of the broadcast signal transmitted from the above-mentioned geostationary satellite SAT 1 is carried out towards the insensible area of the above-mentioned building shade. For this reason, it becomes possible to receive a broadcast signal also in the broadcast receiving set MS which is in building shade.

[0045] At this time, the frequency of the broadcast signal by which junction transmission is carried out from the above-mentioned gap filler equipment GFa is set up identically to the broadcast signal sent from a geostationary satellite SAT 1. For this reason, the broadcast receiving set MS can receive the broadcast signal from gap filler equipment GFa, if there is even a receiving set which receives the broadcast signal from a geostationary satellite SAT 1 without using a special receiving set even when it is in building shade.

[0046] And the broadcast range was limited by using a directional antenna from gap filler equipment GFa to the insensible area of building shade, and the broadcast signal is transmitted. For this reason, in spite of having set up identically to the signal frequency sent from a geostationary satellite SAT 1 the frequency of the signal transmitted from gap filler equipment GFa, there are few fears of the sending signal of gap filler equipment GFa interfering in a signal from a geostationary satellite SAT 1 around the insensible area used as the above-mentioned building shade, and thereby, the broadcast receiving set MS can receive a broadcast signal in high quality, when it is in every area.

[0047] (2nd operation gestalt) When a radio signal is generally transmitted from the geostationary satellite arranged on the geostationary orbit of the equatorial sky, in the ground, shade of an electric wave is made on the north side of obstructions, such as a building. Paying attention to this point, in the area where many buildings are located in a line, the 2nd operation gestalt of this invention gives directivity in the direction of east and west from gap filler equipment, and is made to carry out junction transmission of the broadcast signal.

[0048] Drawing 3 and drawing 4 are drawings for explaining this operation gestalt. Namely, in the location where the building stands close together along a road like shopping quarter or a street lined with office buildings, as the insensible area which cannot carry out direct reception of the radio signal from a geostationary satellite SAT 1 with these buildings on the north side shows with the slash in drawing 3 , it is formed in the direction of east and west band-like.

[0049] So, with this operation gestalt, gap filler equipment GFb is installed in the location which can carry out direct reception of the broadcast signal from a geostationary satellite SAT 1 like a crossing big, for example. As that installation means, a stanchion 45 is set up, for example on a paved road, and it is carried out by fixing gap filler equipment GFb on this stanchion 45.

[0050] Gap filler equipment GFb is equipped with the body 42 which held the transceiver circuit sections, such as a low noise amplifier and power amplifier, and it attaches the antennas 43 and 44 for retransmission of message in two lateral portions with which a body 42 disagrees, respectively while it attaches in the upper part of this body 42 the antenna 41 which receives the broadcast signal from a geostationary satellite SAT. The sense of the antennas 43 and 44 for these retransmission of message is set up so that the transmit direction of a retransmission-of-message radio signal may turn into the direction of east and west.

[0051] In addition, when the existing stanchions, such as a stanchion for road signs currently installed in the foot walk etc., a stanchion for signals, and a telegraph pole, can be used, gap filler equipment GFb may be installed in the above-mentioned existing stanchion, without forming the stanchion 45 of dedication.

[0052] Thus, if it is this operation gestalt, the broadcast signal sent from the geostationary satellite SAT 1 will be transmitted in the direction of east and west with directivity, as shown in drawing 3 and drawing 4 from the antennas 43 and 44 for junction transmission, after reception magnification is carried out with gap filler equipment GFb. Therefore, the gap area which cannot carry out direct reception of the broadcast signal from a geostationary satellite SAT 1 can be effectively covered only by installing a small number of gap filler equipment.

[0053] In addition, gap filler equipment GFb is not necessarily restricted to what attached the antenna 41 for satellite reception, and the antennas 43 and 44 for retransmission of message in the body 42 in one. For example, while installing the body 42 furnished with the antenna 41 for satellite reception in the location which can receive the signal from a geostationary satellite SAT 1 more certainly like the roof of a building The antennas 43 and 44 for junction transmission are attached in the stanchion for indicators currently installed in the crossing, the stanchion for signals, a telegraph pole, etc., and between these bodies 42 and the antennas 43 and 44 for retransmission of message is connected through a coaxial cable. Although connection between a body 42 and the antennas 43 and 44 for retransmission of message will become troublesome a little if it does in this way, gap filler equipment with the high receiving engine performance can be offered. In addition, it is usable in a patch antenna small as the above-mentioned antennas 43 and 44.

[0054] Moreover, when it covers wide range band-like insensible area, it is good to install gap filler equipment GFc in a height like the roof of a building, as shown in drawing 5 , and to make it transmit from this roof with directivity to insensible area. Drawing 5 shows the case where dozens of km to several km insensible area is covered by this

configuration.
[0055] In addition, as shown, for example in drawing 6 depending on the configuration of insensible area, gap filler equipment GFd is installed in a steel tower etc., and it may be made to carry out junction transmission of the broadcast signal from this gap filler equipment GFd using a nondirectional antenna. If it does in this way, the insensible area of a wide range circle configuration can be covered.
[0056] (3rd operation gestalt) The 3rd operation gestalt of this invention multiplexes two or more channel signaling transmitted towards a satellite from a ground broadcasting station with a CDM (Code Division Multiplex) method, amplifies the above-mentioned CDM multiplex-broadcasting signal which came through the satellite in gap filler equipment, and is made to carry out junction transmission to gap area, such as building shade.
[0057] Drawing 7 is the circuit block diagram showing the configuration of the transmitting section in the ground broadcasting stations BC1 and BC2. The broadcast signal of two or more programs (drawing N program) edited in the circuit which is not illustrated is inputted into Modulators 51-5n, respectively. In these modulators 51-5n, the spread-spectrum modulation of the above-mentioned broadcast signal is carried out by mutually different diffusion code generated from the diffusion code generators 61-6n, respectively, respectively. After the broadcast signal by which the spread-spectrum modulation was carried out with each above-mentioned modulators 51-5n is compounded by one multiplex-broadcasting signal with the synthetic vessel 71, it is inputted into a modulator 72. In this modulator 72, the above-mentioned multiplex-broadcasting signal is further modulated by digital modulation methods, such as QPSK or a QAM method. And after frequency conversion of this modulated multiplexing broadcast signal is carried out to the radio signal of Ka or a Ku band with a transmitter 73 and it is amplified by further predetermined transmitted power, it is transmitted towards a geostationary satellite from an antenna 74.
[0058] A geostationary satellite is transmitted towards a terrestrial service area, after carrying out frequency conversion of the CDM multiplex-broadcasting signal transmitted from the above-mentioned ground broadcasting stations BC1 and BC2 or a feeder link station to S band and amplifying it to predetermined power level.
[0059] Gap filler equipment receives the CDM multiplex-broadcasting signal transmitted from the above-mentioned geostationary satellite, amplifies this input signal to the transmitted power level for gap fillers, and transmits it towards insensible area.
[0060] On the other hand, the broadcast receiving set MS is constituted as follows. Drawing 8 is the circuit block diagram showing the configuration of the broadcast receiving set MS. In this drawing, the CDM multiplex-broadcasting signal transmitted from a geostationary satellite and gap filler equipment is inputted into a receiver 22, after being received by the antenna 21. A receiver 22 carries out reception playback of the broadcast signal corresponding to the channel which the user specified among the above-mentioned CDM multiplex-broadcasting signals with a RAKE receiving method, and inputs this reproduced input signal into voice / image separation circuit section 23.
[0061] Voice / image separation circuit section 23 inputs a receiving video signal into the image decoder 26, and inputs addition data into the addition data decoder 28 while it divides the above-mentioned playback input signal into the addition data which consist of voice data, image data, text data, etc. and inputs this separated receiving voice data into the voice decoder 24. The voice decoder 24 decodes the above-mentioned receiving voice data, reproduces a sound signal, and carries out the sound-reinforcement output of this sound signal from a loudspeaker 25. Moreover, the image decoder 26 is receiving image data MPEG4 It decodes with a method, and this decoded video signal is supplied and displayed on a liquid crystal display 27. Furthermore, the addition data decoder 28 decodes the addition data which consist of text data etc., and displays this decoded decode data on a liquid crystal display 27 with the above-mentioned video signal.
[0062] By the way, the above-mentioned receiver 22 is constituted as follows. Drawing 9 is the circuit block diagram showing the configuration. That is, the down convert of the CDM multiplex-broadcasting signal which came from a geostationary satellite and gap filler equipment is first carried out from a radio frequency in the wireless circuit 28 at a baseband frequency. And after this receiving baseband signaling is digitized with a predetermined sampling period in an analog / digital transducer (A/D) 29, it is inputted into the search receiver 30 and three digital data demodulators 31, 32, and 33, respectively.
[0063] The search receiver 30 is the same configuration as each digital data demodulators 31, 32, and 33 which carry out the reception recovery of the pilot signal transmitted from the ground broadcasting stations BC1 and BC2, and are described below fundamentally.
[0064] The data demodulators 31, 32, and 33 recover the broadcast signal corresponding to the channel specified by a user from from with a RAKE receiving method among the CDM multiplex-broadcasting signals which came from the CDM multiplex-broadcasting signal or gap filler equipment which came from the geostationary satellite.
[0065] That is, the data demodulators 31, 32, and 33 generate an original clock on the basis of the sampling clock of said A/D converter 29, mutually-independent [of them] is carried out with this original clock, they operate, and are equipped with the initial prehension section, the clock tailing section, and the data recovery section, respectively. Among these, the data recovery section is equipped with the phase compensation section 311,321,331, the multiplier 312,322,332, the PN code generator 313,323,333, and the accumulator 314,324,334.
[0066] In the phase compensation section 311,321,331, phase compensation of an input signal is performed for pass diversity. In a multiplier 312,322,332, the multiplication of the PN code corresponding to the assignment channel generated from the PN code generator 313,323,333 is carried out to the input signal outputted from the above-mentioned phase compensation section 311,321,331, and, thereby, the spectrum back diffusion of electrons of the above-mentioned input signal is performed to it. In an accumulator 314,324,334, the integral of the input signal after

the back diffusion of electrons outputted from the above-mentioned multiplier 312,322,332 is performed, and the integrator output is inputted into the symbol composition machine 34, respectively.
[0067] The symbol composition machine 34 compounds the integrator output of the input signal outputted from each above-mentioned digital data demodulators 31, 32, and 33, reproduces a data component, and supplies it to the voice / image separation section 23 which shows this playback data component to drawing 8 .
[0068] A control section 35 is what was equipped with the microcomputer as the main control section, and is equipped with the pass location detection means and the PN code generating control means as a control function concerning RAKE reception. A pass location detection means detects the pass location of the signal which came from the signal and gap filler equipment which came from the above-mentioned geostationary satellite SAT from the pilot signal received with the search receiver 2, respectively. A PN code generating control means calculates optimal PN address value based on the detection result of the above-mentioned pass location, and supplies this PN address value to the PN code generator 313,323,333 of the three above-mentioned digital data demodulators 31, 32, and 33. And adjustable control of the chip phase of the PN code generated from each PN code generator 313,323,333 by this is carried out.
[0069] By using the broadcast receiving set MS of such a configuration, reception playback can be carried out, respectively and the CDM multiplex-broadcasting signal sent from the geostationary satellite and the CDM multiplex-broadcasting signal to which it retransmitted a message from gap filler equipment can be compounded so that a multi-pass signal may be received. That is, pass diversity reception of the CDM multiplex-broadcasting signal sent from the geostationary satellite and the CDM multiplex-broadcasting signal by which junction transmission was carried out from gap filler equipment can be carried out. For this reason, the broadcast receiving set MS can receive high quality, without causing interference among both signals, even when located in the area which can receive both the CDM multiplex-broadcasting signal from a geostationary satellite, and the junction sending signal from gap filler equipment.
[0070] Moreover, according to this operation gestalt, since it becomes unnecessary to worry about interference by the same frequency between the CDM multiplex-broadcasting signal from a geostationary satellite, and the junction sending signal from gap filler equipment, it becomes unnecessary to adjust strictly the directivity of the signal broadcast again from gap filler equipment, and, thereby, gap filler equipment can be installed easily.
[0071] (4th operation gestalt) The 4th operation gestalt of this invention By making two sets of the geostationary satellites which consist of this machine launched on the same geostationary orbit, and a command support aircraft estrange at the predetermined spacing, arranging them, synchronizing the same broadcast signal mutually from these geostationary satellites, and transmitting to a service area Even if it is the broadcast receiving set MS which is present in the area which cannot receive the broadcast signal from this machine, it enables it to receive the broadcast signal from a command support aircraft.
[0072] Drawing 10 is the outline block diagram of the satellite broadcasting service system concerning this operation gestalt. It sets to this drawing, and on the geostationary orbit, two sets of geostationary satellites SATa and SATb leave only a predetermined distance, and it is arranged. Each above-mentioned geostationary satellites SATa and SATb do not change a command support aircraft into a standby condition, also while this machine and another side function [one side] as a command support aircraft and this machine is functioning normally, but he is trying to transmit the same broadcast signal as this machine.
[0073] Since it is such a configuration, in the mobile station MS which is present in the area which cannot receive the broadcast signal RSa from this machine SATa with a building etc. as shown, for example in drawing 7 , the broadcast signal RSb from a command support aircraft SATb is receivable. Moreover, the mobile station MS which is present in the area which cannot receive the broadcast signal RSb from a command support aircraft SATb on the contrary can receive the broadcast signal RSa from this machine SATa. Therefore, according to this operation gestalt, even if it does not install gap filler equipment on the ground, it becomes possible to lose gap area. And since the gap filler effectiveness is realized with this operation gestalt using the existing command support aircraft, it is not necessary to launch a new satellite and there is a cheaply realizable advantage.
[0074] (5th operation gestalt) The 5th operation gestalt of this invention The 1st broadcast signal for the broadcast receiving sets with which frequencies differ mutually the broadcast signal which the ground broadcasting station or the feeder link station transmitted in a geostationary satellite, Frequency conversion is carried out to the 2nd broadcast signal for gap filler equipments, and it transmits to it, and with gap filler equipment, after receiving the broadcast signal of the above 2nd and changing this into the broadcast signal of the same frequency as the 1st broadcast signal, it is made to carry out junction transmission towards insensible area.
[0075] Drawing 11 is the outline block diagram of the satellite broadcasting service system concerning this operation gestalt. Moreover, drawing 12 shows the configuration of the transponder carried in the geostationary satellite SAT 2 of this system, and drawing 13 shows the configuration of gap filler equipment further.
[0076] In the transponder of a geostationary satellite SAT 2, after the uphill broadcast signal UL (frequency fua) of the Ku band transmitted from the ground broadcasting station BC is received by the receiving antenna 81, it is amplified with a low noise amplifier 82, and it is inputted into a signal distribution box 83. In a signal distribution box 83, the above-mentioned uphill broadcast signal is distributed to two lines.
[0077] And after frequency conversion is carried out to the radio frequency signal (frequency fs) of S band with the 1st frequency converter 84, the broadcast receiving set of a fixed station or a mobile station MS is amplified by transmitted power level required to receive with the 1st power amplifier 86, the 1st gets down from the transmitting antenna 88 for appropriate after S bands, and the broadcast signal of one network is transmitted towards a

terrestrial service area as a broadcast signal DLa.
[0078] On the other hand, after frequency conversion is carried out to the radio frequency signal (frequency fub) of a Ku band with the 2nd frequency converter 85, gap filler equipment GFe is amplified by transmitted power level required to receive with the 2nd power amplifier 87, the 2nd gets down from the transmitting antenna 89 for appropriate after Ku bands, and the broadcast signal of the network of another side by which signal distribution was carried out is transmitted as a broadcast signal DLb. In addition, the frequency is changed, although the above 2nd gets down, it goes up with the broadcast signal DLb and both the broadcast signals UL are transmitted by the Ku band. For example, the 2nd gets down, the frequency fub of the broadcast signal DLb is set as 14GHz, and the frequency fua of the uphill broadcast signal UL is set as 12GHz.
[0079] On the other hand, with gap filler equipment GFe, the 2nd broadcast signal DLb transmitted from the above-mentioned geostationary satellite SAT 2 is amplified by the low noise amplifier 92, after being received by the antenna 91, and it is inputted into a frequency converter 93. In this frequency converter 93, the 2nd which carried out [above-mentioned] reception gets down, the 1st which the radio frequency signal SAT 2 of S band (frequency fs), i.e., said geostationary satellite, transmits for broadcast receiving sets gets down, and frequency conversion of the broadcast signal is carried out to the radio frequency signal of the same frequency as the broadcast signal DLa. And the broadcast signal by which frequency conversion was carried out to this S band is amplified with power amplifier 94 by the transmitted power level corresponding to the magnitude of the gap filler covering area GE, and is transmitted towards the gap filler covering area GE as a relay broadcast signal DLg from the appropriate back transmitting antenna 95.
[0080] By getting down, since it is such a configuration, and the frequencies of the relay broadcast [which comes from a geostationary satellite SAT 2] signal DLg which transmits towards the frequency of the broadcast signal DLb and the gap filler covering area GE will differ, with gap filler equipment GFe, the surroundings lump by the receiving antenna of the transmitting relay broadcast signal DLg can be prevented easily, and, thereby, isolation during I/O can be realized simply and certainly.
[0081] (6th operation gestalt) The 6th operation gestalt of this invention The 2nd broadcast signal of the contents as the uphill broadcast signal transmitted towards a geostationary satellite with the same ground broadcasting station is transmitted to gap filler equipment via a ground network. Based on the 2nd broadcast signal transmitted through this ground network in gap filler equipment, the same relay broadcast signal as the going-down broadcast signal transmitted to a broadcast receiving set from the above-mentioned geostationary satellite is generated, and this is turned to insensible area and it is made to transmit.
[0082] Drawing 14 is the circuit block diagram showing the configuration. The ground broadcasting station which is not illustrated generates the 2nd broadcast signal which is the same contents as the uphill broadcast signal which a local station transmits towards a geostationary satellite, and was constituted by the signal format for cable transmissions, and transmits this towards gap filler equipment GFf through the ground public networks NW, such as an ISDN network.
[0083] Gap filler equipment GFf will change the signal format of the 2nd broadcast signal of a signal converter 101 smell lever into the signal format for satellite broadcasting services from the format for cable transmissions, if a modem receives the 2nd broadcast signal from the above-mentioned ground broadcasting station. And after carrying out frequency conversion of the broadcast signal for this satellite transmission to the radio frequency signal of S band with a frequency converter 102 and amplifying to the transmitted power level corresponding to the magnitude of insensible area with power amplifier 103 further, it transmits towards insensible area, such as building shade, from the transmitting antenna 104 by making this into a relay broadcast signal.
[0084] Since it is such a configuration, even when it cannot install in the location which gets off a geostationary satellite from gap filler equipment, and can receive a broadcast signal, a broadcast signal can be certainly broadcast to insensible area.
[0085] In addition, it has the circuit which gets off a geostationary satellite as shown in the above-mentioned gap filler equipment GFf at drawing 2 or drawing 13 in addition to the circuit which receives a broadcast signal via the above-mentioned ground public network NW, and generates a relay broadcast signal, receives a broadcast signal, and is changed into a relay broadcast signal. And according to the installation conditions of gap filler equipment, the broadcast signal generated by each above-mentioned circuit is chosen, and you may make it transmit to insensible area.
[0086] moreover, when judged with having further the circuit which gets off a geostationary satellite and judges the receiving quality of a broadcast signal, getting down by this judgment circuit, and the broadcast signal being received in predetermined receiving quality When judged with choosing the relay broadcast signal which got off the geostationary satellite and was generated based on the broadcast signal, transmitting to insensible area, and on the other hand the above-mentioned predetermined receiving quality not being acquired The relay broadcast signal generated based on the 2nd broadcast signal transmitted through the ground public network NW is chosen, and you may make it transmit to insensible area.
[0087] (7th operation gestalt) The 7th operation gestalt of this invention gives the function to generate the monitor information which expresses the operating state of self-equipment with gap filler equipment, and to transmit this to a monitor center, and supervises the operating state of gap filler equipment based on the above-mentioned monitor information in a monitor center.
[0088] Drawing 15 shows the 1st example of the system concerning this operation gestalt. In this drawing, it is accumulated in memory, using gap filler equipment GFg as the information which detected the element which gets

down and expresses the operating state of self-equipments, such as receiving level of a broadcast signal, and a transmission level of a relay broadcast signal, with the fixed time interval, and also boiled this.
[0089] On the other hand, the monitor center MCa generates the Request to Send of monitor information to the timing of periodical or arbitration, and sends out this Request to Send to the above-mentioned gap filler equipment GFg through the ground network NW. If it does so, gap filler equipment GFg will read monitor information from memory, and will transmit this to the monitor center MCa through the above-mentioned ground network NW. In addition, although the monitor information transmitted to the monitor center MCa at this time may be only the newest monitor information, you may make it transmit all the monitor information accumulated by this transmission timing from the last transmission timing.
[0090] That is, from two or more gap filler equipments with which a service area is dotted, the monitor center MCa collects monitor information by polling, and displays or prints out these collected monitor information. Moreover, it judges with it whether the operating state of gap filler equipment is normal based on the contents of monitor information, and the judgment result is displayed.
[0091] With such a configuration, in the monitor center MCa, the centralized control of the operating state of each gap filler equipment GFg can be carried out, and efficient maintenance is attained. Moreover, since monitor information is collected by polling, much monitor information on the gap filler equipment of ** is efficiently collectable.
[0092] Drawing 16 shows the 2nd example of the system concerning this operation gestalt. In this drawing, it connects through a satellite communication circuit between each gap filler equipment GFh and the monitor center MCb. And whenever the Request to Send of monitor information comes from the monitor center MCb through the above-mentioned satellite communication circuit, after gap filler equipment GFh reads monitor information from memory and changes this monitor information into the signal format for satellite communication, it is transmitted to the monitor center MCb through a satellite communication circuit.
[0093] According to such a configuration, since monitor information is collectable from each gap filler equipment using the satellite communication circuit of the existing geostationary satellite, the communication line which used the ground network NW can be made unnecessary.
[0094] In addition, each example described above explained the case where the monitor information on the gap filler equipments GFg and GFh was collected by polling from the monitor centers MCa and MCb. However, the self-diagnosis function of operating state is given to the gap filler equipments GFg and GFh, in addition to the collection function by this polling, when abnormalities of operation are detected, the monitor centers MCa and MCb are called from the gap filler equipments GFg and GFh, and you may make it notify the monitor information concerning the above-mentioned abnormalities to the monitor centers MCa and MCb.
[0095] If it does in this way, if abnormalities of operation occur with gap filler equipment, a monitor center can know that instancy, and it will become possible to devise restoration treatment quicker than this result.
[0096] Furthermore, when the receiving abnormalities of the broadcast signal from a satellite and abnormalities [gap filler equipment GFg and own] of GFh of operation occur with the gap filler equipments GFg and GFh, while notifying a message to that effect to the monitor centers MCa and MCb, you may make it transmit towards the broadcast receiving set which exists in insensible area. as the message notified to each broadcast receiving set at this time -- for example -- "-- the receive state from a satellite is getting worse now. Please wait for a while to restoration. An alphabetic character message or voice-told messages, such as ", are used.
[0097] Drawing 17 shows the 3rd example of the system concerning this operation gestalt. In this drawing, it gets down, and in case [at which it came from the geostationary satellite] a relay broadcast signal is generated and it transmits based on a broadcast signal, gap filler equipment GFi multiplexes the monitor information showing the operating state of self-equipment to the above-mentioned relay broadcast signal, and transmits it towards insensible area. A FDM system and a CDM method can be used as a multiplex system.
[0098] The receiving set MR for monitors is arranged in the location of the arbitration of insensible area, for example, the location equivalent to the edge of area. The thing and the thing of a car loading mold of the handicap type which a customer engineer carries are sufficient as this receiving set MR for monitors, and it may be installed still more nearly fixed. The receiving set MR for monitors detects the receiving level of the above-mentioned relay broadcast signal while it receives the relay broadcast signal transmitted from the above-mentioned gap filler equipment GFi and carries out the separation extract of the monitor information. And the detection data of this receiving level are included in the above-mentioned monitor information, and this monitor information is transmitted to the monitor center MCc through the mobil radio communication networks INW, such as a cellular radiotelephone system and PHS.
[0099] Thus, if it is a configuration, the detection data of the receiving level surveyed with the receiving set MR for monitors with the monitor information generated by gap filler equipment can be transmitted to the monitor center MCc. For this reason, in the monitor center MCc, own operating state of gap filler equipment can also judge the compatibility of a transmission level and the actual receiving level in insensible area from the first.
[0100] In addition, this invention is not limited to each above-mentioned operation gestalt. For example, you may make it cover mutually the area which cannot be covered by the mutual method by using together the method which installs gap filler equipment on the ground, and covers insensible area, and the method which covers insensible area using two geostationary satellites.
[0101] Moreover, the satellite broadcasting service system which used the geostationary satellite is taken for an example, gap filler equipment receives the broadcast signal sent from the geostationary satellite, and it was made to

retransmit a message to the broadcast receiving set MS with said each operation gestalt. However, gap filler equipment relays not only it but the signal transmitted towards the satellite in the satellite broadcasting service system interactive, for example from the broadcast receiving set MS, and you may make it transmit to a satellite.
[0102] Furthermore, with said operation gestalt, although explained taking the case of the case where the insensible area produced in building shade is covered, this invention can be similarly applied, when it covers the gap area produced with natural objects, such as other buildings, such as a steel tower, a crest, and a cliff.
[0103] Furthermore, this invention can be applied also when it covers indoor insensible area. For example, it gets off a satellite like a place by the window, the small gap filler equipment for the interior of a room (repeater) is installed in the location which can direct receive a broadcast signal, a relay broadcast signal is transmitted to the interior of a room from this repeater, and a receiving set is made to receive. In this case, you may constitute so that a receiving set may be connected to a repeater through a coaxial cable etc. and the received going-down broadcast signal may be transmitted to a receiving set through this coaxial cable. Moreover, the above-mentioned repeater may be installed in the roof or the roof of a building or a house.
[0104] In addition, also with the configuration of gap filler equipment, the class of an installation and broadcast receiving set MS, a configuration and the class of satellite, the class of signal transmitted from a satellite, or its transmitting method, in the range which does not deviate from the summary of this invention, it deforms variously and can carry out.
[0105]
[Effect of the Invention] As explained in full detail above, according to this invention, gap filler equipment is formed. With this gap filler equipment By receiving the broadcast signal relayed in the satellite and having been made to carry out wireless transmission of this reception broadcast signal on the same frequency as the broadcast signal to which it is transmitted from said satellite to the area which cannot receive the broadcast signal from a satellite in a service area In insensible area, such as building shade which cannot carry out direct reception of the radio signal from a satellite Without forming a large-scale facility, it can be made to be able to receive certainly also not only to a fixed station but to the mobile station MS, and the satellite broadcasting service system which can realize a cheap and effective gap filler by this, and its gap filler equipment can be offered.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The outline block diagram showing the 1st operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Drawing 2] The circuit block diagram showing the configuration of the gap filler equipment used by the system shown in drawing 1 .
[Drawing 3] The top view for explaining the 2nd operation gestalt of the satellite broadcasting service system concerning this invention.
[Drawing 4] The front view for explaining the 2nd operation gestalt of the satellite broadcasting service system concerning this invention.
[Drawing 5] Drawing showing other examples of the 2nd operation gestalt of the satellite broadcasting service system concerning this invention.
[Drawing 6] Drawing showing another example of the 2nd operation gestalt of the satellite broadcasting service system concerning this invention.
[Drawing 7] The circuit block diagram showing the configuration of the transmitting section of the ground broadcasting station used with the 3rd operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Drawing 8] The circuit block diagram showing the configuration of the broadcast receiving set used with the 3rd operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Drawing 9] The circuit block diagram showing the configuration of the receiver of the broadcast receiving set shown in drawing 8 .
[Drawing 10] The outline block diagram showing the 4th operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Drawing 11] The outline block diagram showing the 5th operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Drawing 12] The circuit block diagram showing the configuration of the transponder of the geostationary satellite used by the system shown in drawing 11 .
[Drawing 13] The circuit block diagram showing the configuration of the gap filler equipment used by the system shown in drawing 11 .
[Drawing 14] The outline block diagram showing the 6th operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Drawing 15] The outline block diagram showing the 1st example in the 7th operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Drawing 16] The outline block diagram showing the 2nd example in the 7th operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Drawing 17] The outline block diagram showing the 3rd example in the 7th operation gestalt of the satellite broadcasting service system equipped with the gap filler function concerning this invention.
[Description of Notations]
BC, BC1, BC2 — Ground broadcasting station (VSAT)
SAT1, SAT2, SATa, SATb — Geostationary satellite
MS — Mobile station
MR — Receiving set for monitors
GFa-GFi — Gap filler equipment
MCa-MCc — Monitor center
NW — Ground public network
INW — Mobil radio communication network
11, 41, 81, 91 — Antenna for satellite reception
12 — Input filter
13, 82, 92 — Low noise amplifier
14, 86, 87, 94,103 — Power amplifier
15 — Output filter
16, 43, 44, 88, 89, 95,104 — Antenna for transmission

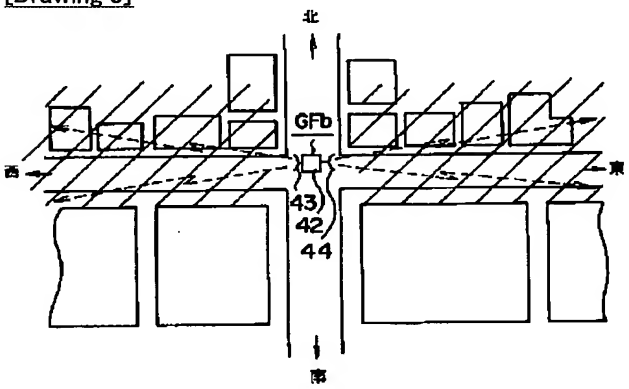
42 — Body of gap filler equipment
45 — Stanchion for gap filler equipment immobilization
20 — Control section
21 — Receiving antenna of a fixed station or a mobile station
22 — Receiver
23 — Voice / image separation circuit section
24 — Voice decoder
25 — Loudspeaker
26 — Image decoder
27 — Liquid crystal display
28 — Wireless circuit
29 — An analog / digital converter (A/D)
30 — Search receiver
31, 32, 33 — Digital data demodulator
34 — Symbol composition machine
35 — Control section
36 — Addition data decoder
311,321,331 — Phase compensation section
312,322,332 — Multiplier
313,323,333 — PN code generator
314,324,334 — Accumulator
84, 85, 93,102 — Frequency converter
101 — Signal converter

[Translation done.]

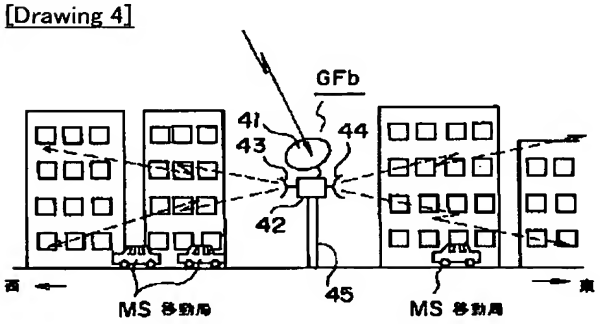
* NOTICES *

DRAWINGS

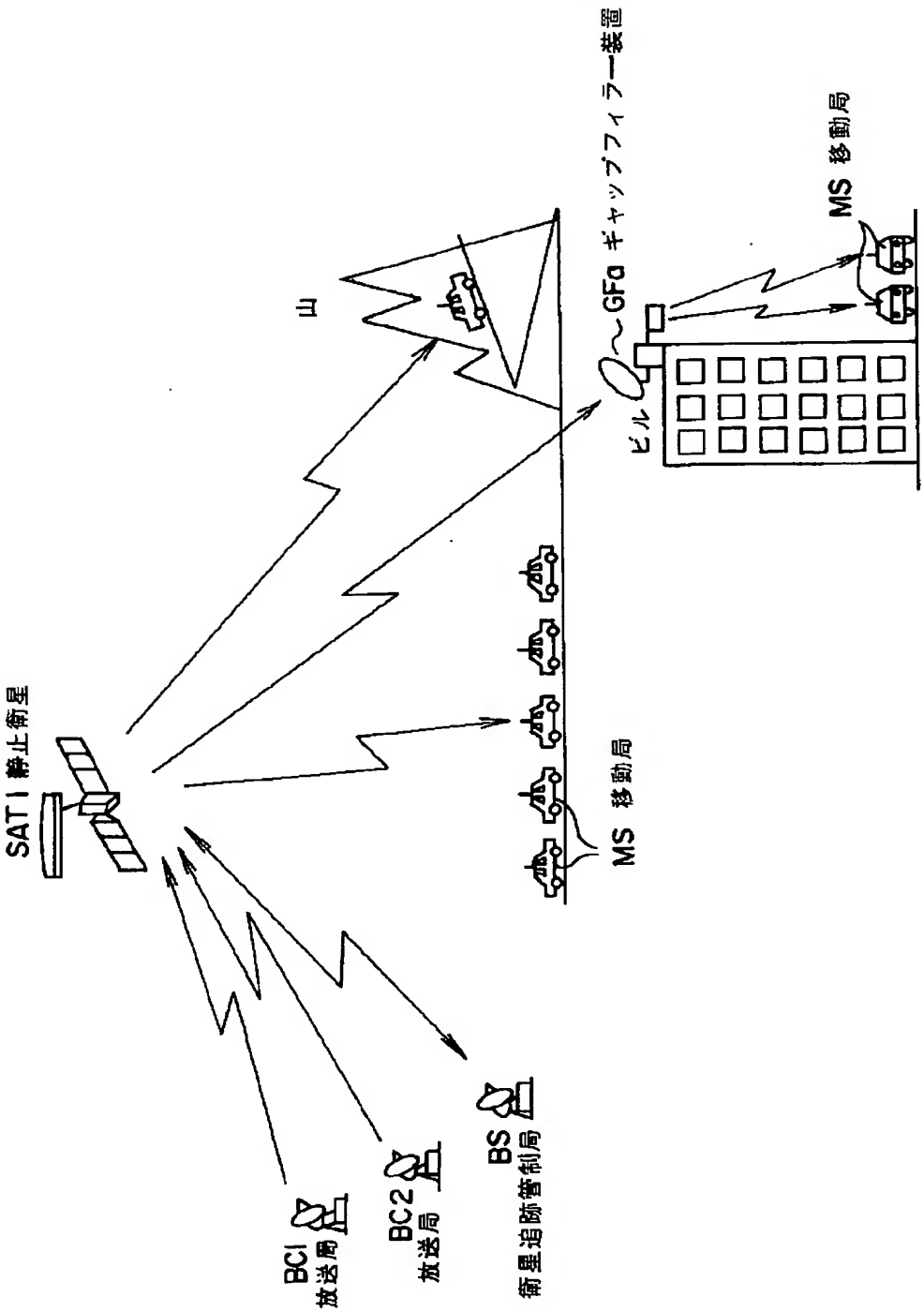
[Drawing 3]



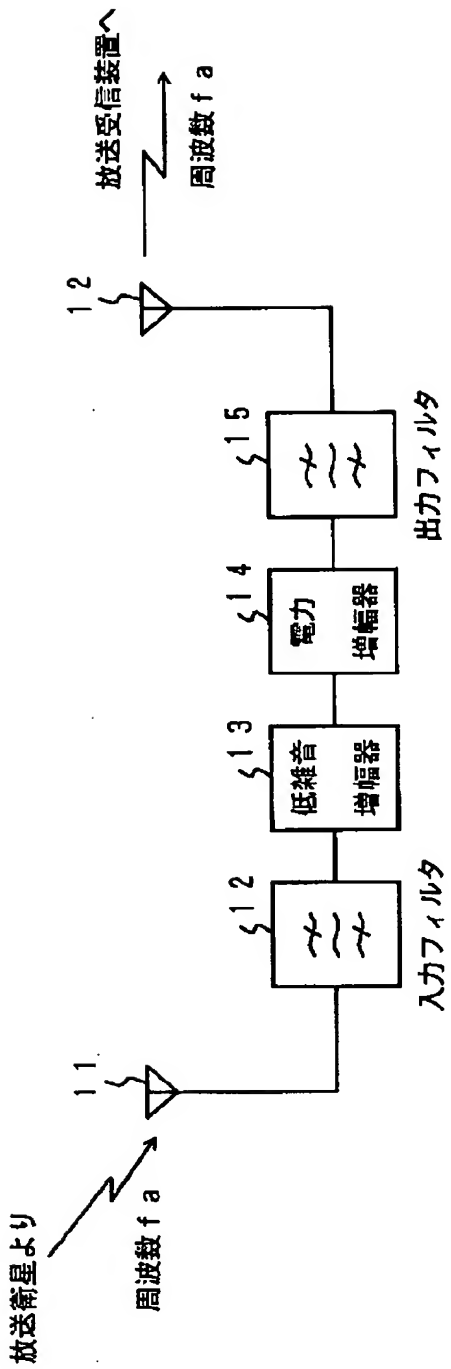
[Drawing 4]



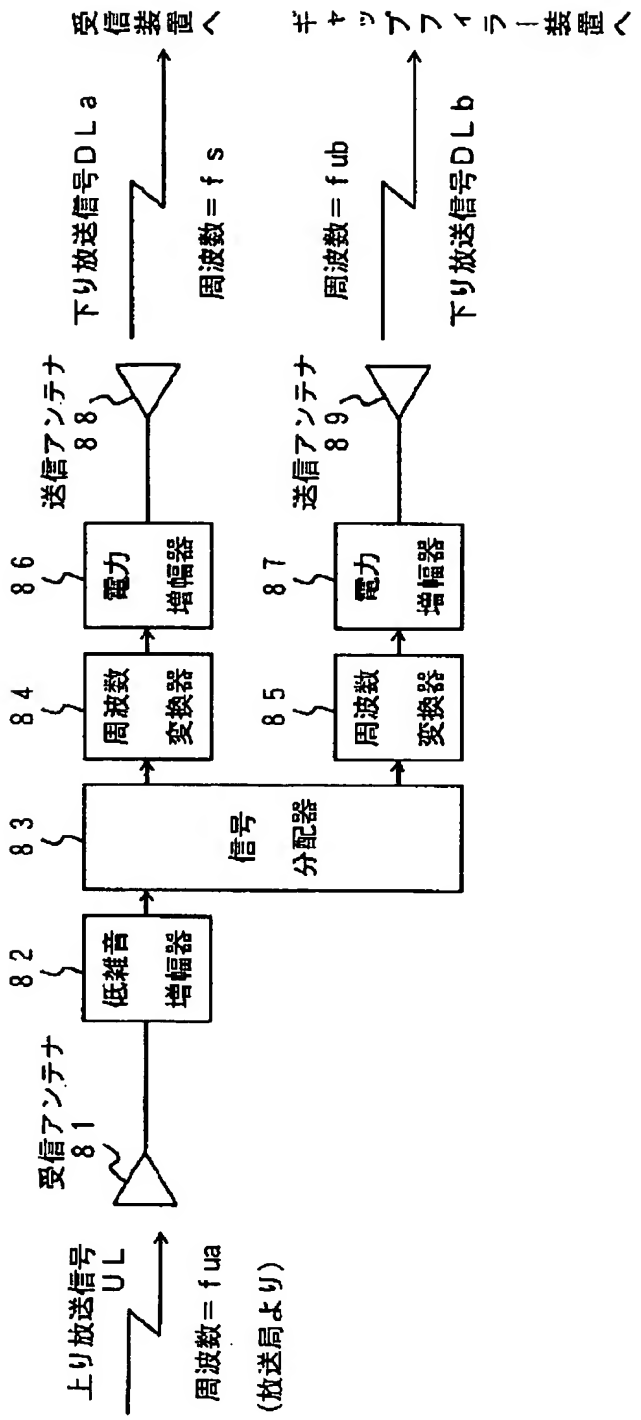
[Drawing 1]


SAT1 静止衛星
BC1 放送局
BC2 放送局
BS 衛星追跡管制局
山
MS 移動局
MS 移動局
ビル
GFa ギャップフィラー装置

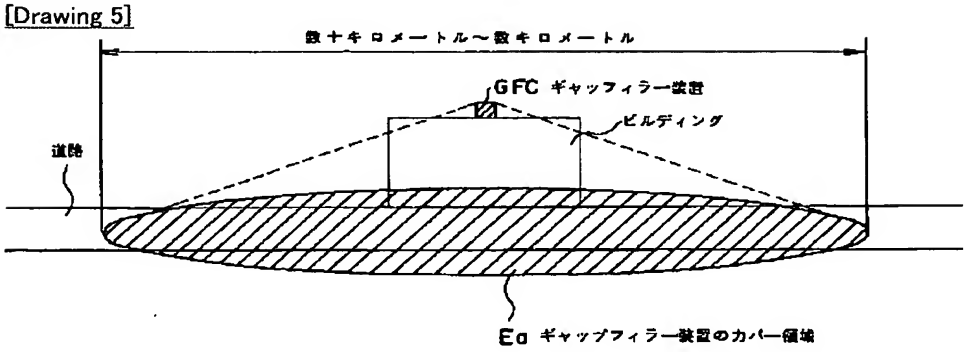
[Drawing 2]


放送衛星より
周波数ｆａ
11
12
入力フィルタ
13
低雑音
増幅器
14
電力
増幅器
15
出力フィルタ
12
放送受信装置へ
周波数ｆａ

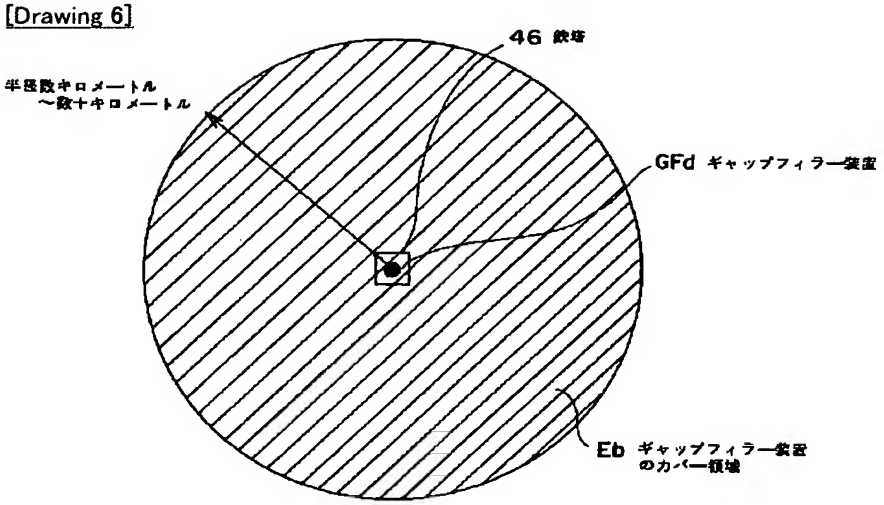
[Drawing 12]


受信装置へ
ギャップフィラー装置へ
下り放送信号ＤＬａ
周波数＝ｆｓ
周波数＝ｆｕｂ
下り放送信号ＤＬｂ
送信アンテナ
８８
送信アンテナ
８９
８６
電力
増幅器
８７
電力
増幅器
８４
周波数
変換器
８５
周波数
変換器
８３
信号
分配器
８２
低雑音
増幅器
受信アンテナ
８１
上り放送信号
ＵＬ
周波数＝ｆｕａ
（放送局より）

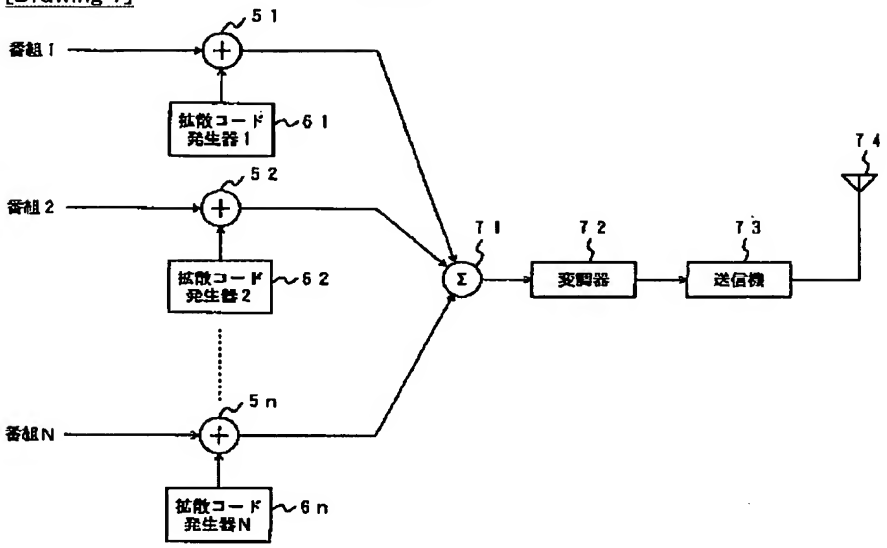
[Drawing 5]


数十キロメートル～数キロメートル
GFC ギャップフィラー装置
ビルディング
道路
Ea ギャップフィラー装置のカバー領域

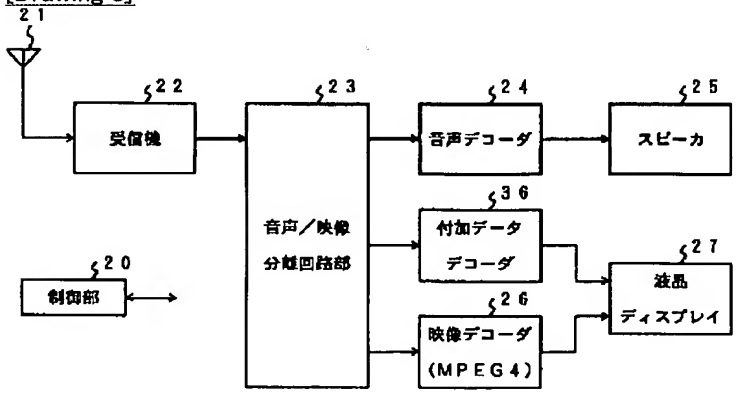
[Drawing 6]



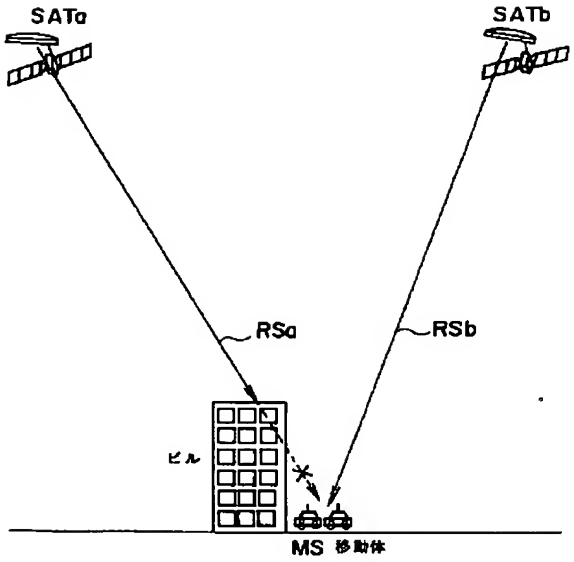
[Drawing 7]



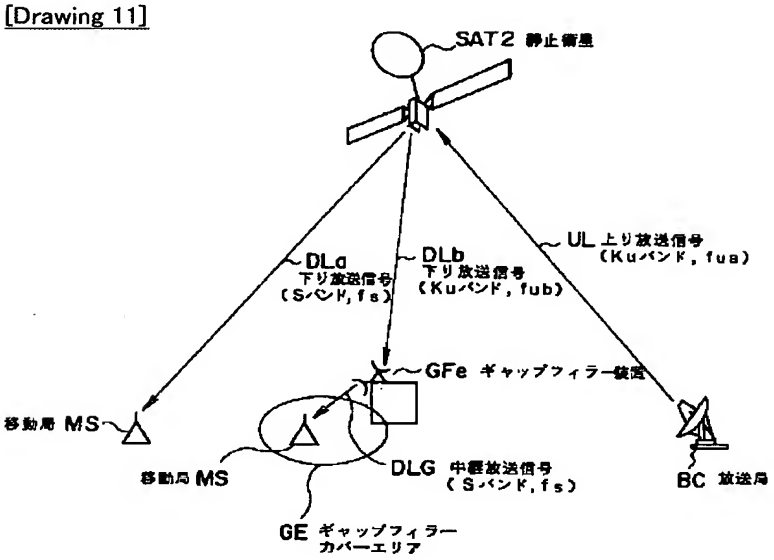
[Drawing 8]



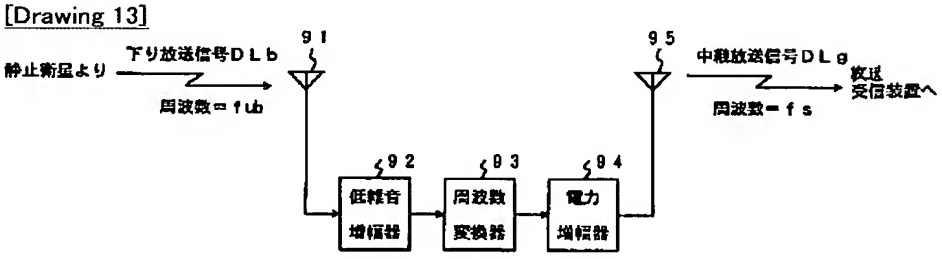
[Drawing 10]



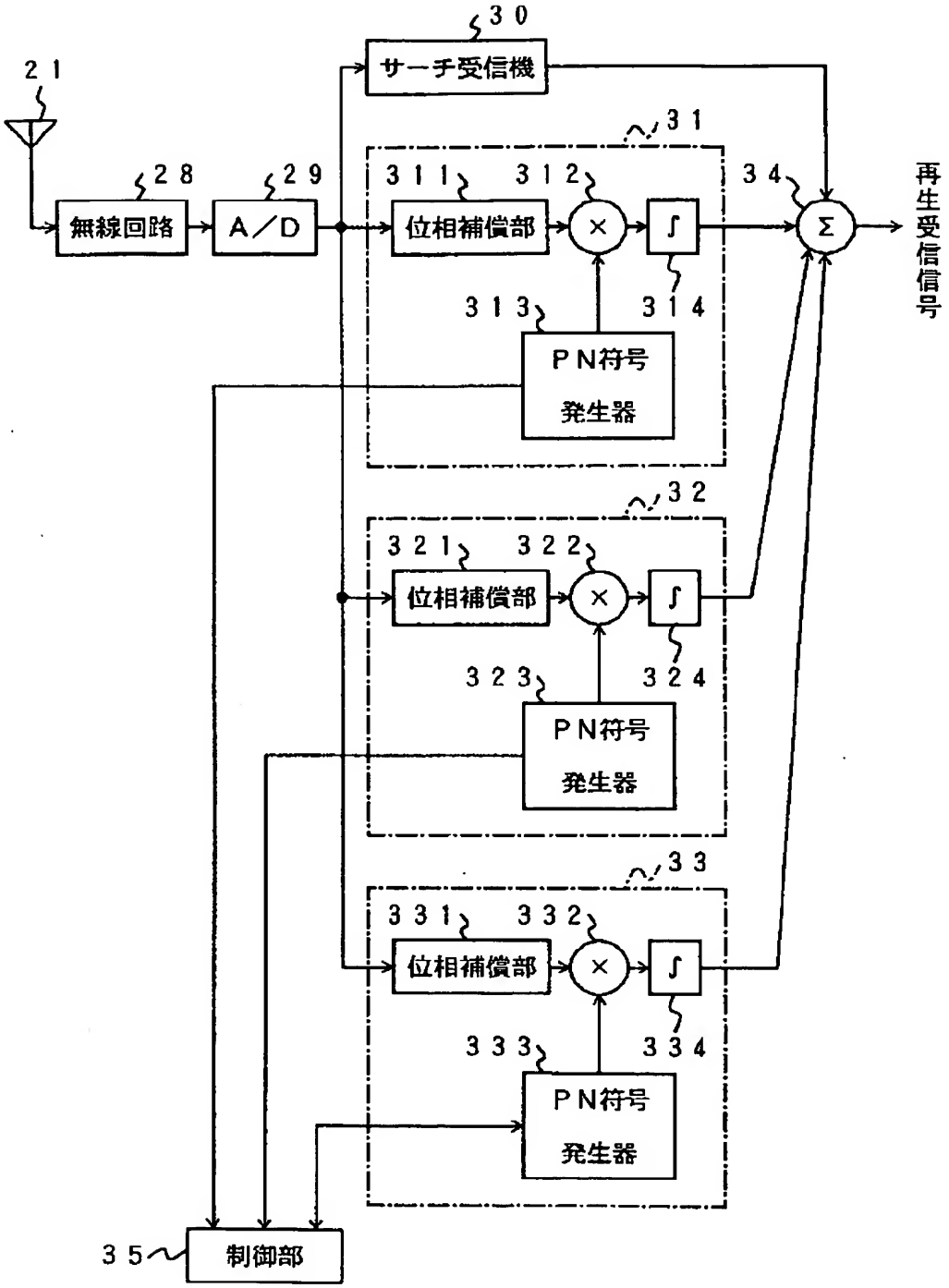
[Drawing 11]



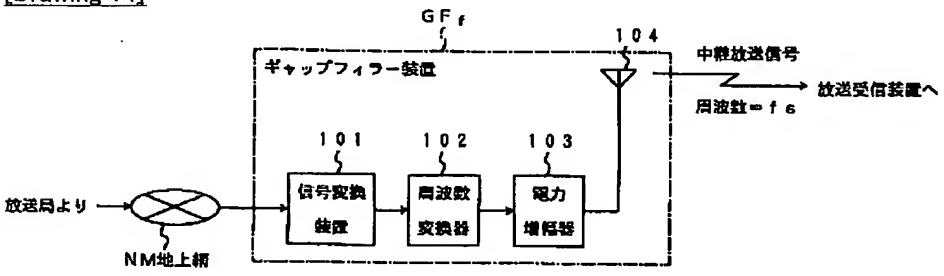
[Drawing 13]



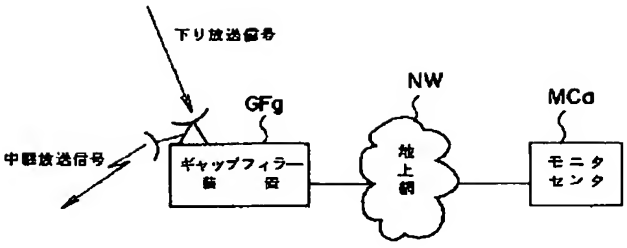
[Drawing 9]



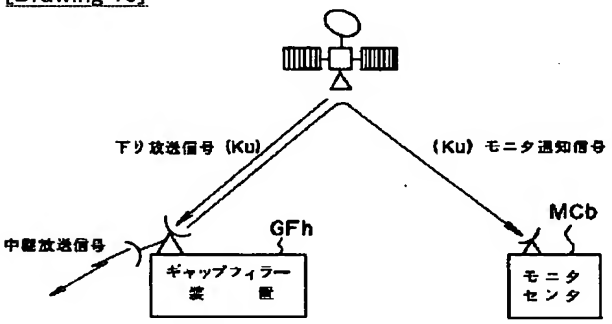
[Drawing 14]



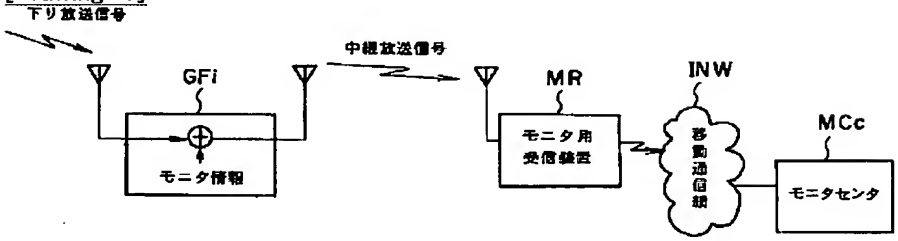
[Drawing 15]



[Drawing 16]



[Drawing 17]



[Translation done.]

* NOTICES *

CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
[Section partition] The 3rd partition of the 7th section
[Publication date] August 3, Heisei 13 (2001. 8.3)

[Publication No.] JP,10-308695,A
[Date of Publication] November 17, Heisei 10 (1998. 11.17)
[Annual volume number] Open patent official report 10-3087
[Application number] Japanese Patent Application No. 9-178659
[The 7th edition of International Patent Classification]

H04B 7/15
7/26

[FI]

H04B 7/15 Z
7/26 A

[Procedure revision]
[Filing Date] August 23, Heisei 12 (2000. 8.23)
[Procedure amendment 1]
[Document to be Amended] Specification
[Item(s) to be Amended] Claim
[Method of Amendment] Modification
[Proposed Amendment]
[Claim(s)]
[Claim 1] In the satellite broadcasting service system which relays with a satellite the broadcast signal which the ground broadcasting station transmitted, and is broadcast to a terrestrial predetermined service area,
The satellite broadcasting service system characterized by providing the gap filler equipment which receives the broadcast signal relayed in said satellite, and carries out wireless transmission of this reception broadcast signal on the same frequency as the broadcast signal to which it is transmitted from said satellite to the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 2] Said gap filler equipment is a satellite broadcasting service system according to claim 1 characterized by having a directional antenna, giving directivity and carrying out wireless transmission of said reception broadcast signal with this directional antenna to the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 3] It is the satellite broadcasting service system according to claim 2 characterized by for said gap filler equipment giving directivity in the direction of east and west for said reception broadcast signal when said satellite is a geostationary satellite arranged in the geostationary orbit of the equatorial sky, and carrying out wireless transmission.
[Claim 4] Either [at least] said ground broadcasting station or said satellite has a modulation means to carry out the spread-spectrum modulation of the broadcast signal with a predetermined diffusion sign, and to transmit,
Said gap filler equipment is a satellite broadcasting service system according to claim 1 characterized by receiving the broadcast signal which was transmitted from said satellite, and by which the spread-spectrum modulation was carried out, and carrying out wireless transmission of this received broadcast signal towards the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 5] It is gap filler equipment used by the satellite broadcasting service system which transmits a broadcast signal to a terrestrial predetermined service area through a satellite,
The 1st antenna for receiving the broadcast signal transmitted from said satellite,
The wireless circuit section for outputting the transmitting broadcast signal which amplifies at least the broadcast signal received by this 1st antenna, and consists of the same frequency as the reception broadcast signal concerned,

Gap filler equipment characterized by providing the 2nd antenna for carrying out wireless transmission of the transmitting broadcast signal outputted from this wireless circuit section to the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 6] It is gap filler equipment according to claim 5 characterized by being what said 2nd antenna gives directivity in the direction of east and west for a transmitting broadcast signal when said satellite is a geostationary satellite arranged in the geostationary orbit of the equatorial sky, and carries out wireless transmission.
[Claim 7] The 1st satellite which turns to a terrestrial predetermined service area the broadcast signal which has been arranged on a predetermined orbit and sent from the ground broadcasting station, and is transmitted,
The satellite broadcasting service system characterized by providing the 2nd satellite which takes a synchronization mutually and transmits the same broadcast signal as the broadcast signal which a predetermined distance is separated, it is arranged on the same orbit as this 1st satellite, and said 1st satellite transmits towards said service area.
[Claim 8] The satellite broadcasting service system according to claim 7 characterized by using the command support aircraft of the 1st satellite for said 2nd satellite.
[Claim 9] The satellite for relaying the broadcast signal transmitted from the ground broadcasting station, and transmitting to a terrestrial predetermined service area,
Two or more broadcast receiving sets which had the function which receives the broadcast signal relayed by said satellite in said service area, and is reproduced,
The gap filler equipment which receives the broadcast signal relayed by said satellite, and transmits this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area is provided,
It has the conversion means which said satellite changes the broadcast signal transmitted from the ground broadcasting station into the 1st and 2nd broadcast signals with which frequencies differ mutually, and carries out wireless transmission, respectively,
Said gap filler equipment is the satellite broadcasting service system characterized by to have a means receive the 2nd broadcast signal transmitted from said satellite, and change this 2nd broadcast signal into the 3rd broadcast signal of the same frequency as said 1st broadcast signal, and the means which turn this 3rd broadcast signal to the area which cannot receive the 1st broadcast signal from said satellite in said service area, and carry out wireless transmission.
[Claim 10] Said broadcast receiving set is a satellite broadcasting service system according to claim 9 characterized by having further a means to receive, respectively and to compound said 1st broadcast signal and the 3rd broadcast signal.
[Claim 11] The conversion means of said satellite is a satellite broadcasting service system according to claim 9 characterized by transmitting said 2nd broadcast signal as a signal for said gap filler equipments while changing into the 2nd broadcast signal of a RF region the broadcast signal transmitted from the ground broadcasting station from the 1st broadcast signal and S band of S band and transmitting the 1st broadcast signal as a signal for said broadcast receiving sets.
[Claim 12] In the satellite broadcasting service system which relays in a satellite the broadcast signal which the ground broadcasting station transmitted, and is transmitted to a terrestrial predetermined service area,
A ground network transmission means to transmit the 2nd broadcast signal of the contents as the 1st broadcast signal which transmits towards said satellite with said same ground broadcasting station through a ground network,
The satellite broadcasting service system characterized by to provide the gap filler equipment which receives the 2nd broadcast signal transmitted by this ground network transmission means, changes this 2nd broadcast signal that received into the 3rd broadcast signal of the same frequency band as the broadcast signal which said satellite transmits, turns this 3rd broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area, and carries out wireless transmission.
[Claim 13] It is gap filler equipment used by the satellite broadcasting service system which relays in a satellite the broadcast signal which the ground broadcasting station transmitted, and is transmitted to a terrestrial predetermined service area,
The ground network receiving means for receiving the 2nd broadcast signal of the contents as the broadcast signal transmitted towards said satellite with said same ground broadcasting station from said ground broadcasting station through a ground network,
A conversion means to change the 2nd broadcast signal received by this ground network receiving means into the 3rd broadcast signal of the same frequency band as the broadcast signal which said satellite transmits,
Gap filler equipment characterized by providing the transmitting means which turns the 3rd broadcast signal obtained by this conversion means to the area which cannot receive the broadcast signal from said satellite in said service area, and carries out wireless transmission.
[Claim 14] It is gap filler equipment used by the satellite broadcasting service system which relays in a satellite the broadcast signal which the ground broadcasting station transmitted, and is transmitted to a terrestrial predetermined service area,
The satellite receiving means for receiving the broadcast signal transmitted from said satellite,
The ground network receiving means for receiving the 2nd broadcast signal of the contents as the broadcast signal transmitted towards said satellite with said same ground broadcasting station through a ground network,
The conversion means for changing the 2nd broadcast signal received by this ground network receiving means into the 3rd broadcast signal of the same frequency band as the broadcast signal to which it is transmitted from said

satellite,
Gap filler equipment characterized by having chosen either the broadcast signal received by said satellite receiving means or the 3rd broadcast signal obtained by said conversion means, and providing the selection transmitting means which carries out wireless transmission towards the area which cannot receive the broadcast signal from said satellite in said service area.
[Claim 15] Said selection transmitting means judges whether the broadcast signal more than predetermined level is received by the satellite receiving means. Choose the broadcast signal received by the satellite receiving means when judged with being received, and wireless transmission is carried out to said non-receipt area. Gap filler equipment according to claim 14 characterized by turning to said non-receipt area the 3rd broadcast signal obtained by said conversion means when judged with on the other hand not being received, and carrying out wireless transmission.
[Claim 16] In the satellite broadcasting service system which relays a broadcast signal with a satellite and is broadcast to a terrestrial predetermined service area,
Gap filler equipment which receives the broadcast signal relayed in said satellite, and carries out wireless transmission of this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area,
The supervisory equipment connected through a communication line to this gap filler equipment is provided,
Said gap filler equipment is equipped with a monitor information transmitting means to generate the monitor information showing the operating state of self-equipment, and to transmit this monitor information to said supervisory equipment through said communication line,
Said supervisory equipment is a satellite broadcasting service system characterized by having a means to perform predetermined processing for receiving the monitor information transmitted through said communication line from said gap filler equipment, and supervising the operating state of said gap filler equipment based on this received monitor information.
[Claim 17] It has that said supervisory equipment is periodical or a means to transmit the Request to Send of monitor information to said gap filler equipment through said communication line at the time of the need,
The monitor information transmitting means of said gap filler equipment is a satellite broadcasting service system according to claim 15 characterized by having a means to accumulate monitor information, and a means to read said monitor information and to transmit to supervisory equipment whenever a Request to Send comes from said supervisory equipment.
[Claim 18] The monitor information transmitting means of said gap filler equipment is a satellite broadcasting service system according to claim 15 characterized by having a means to transmit the monitor information which expresses those contents when it is detected that abnormalities occurred in the operating state of self-equipment with a means to supervise the operating state of self-equipment, and this means to said supervisory equipment through a communication line.
[Claim 19] The monitor information transmitting means of said gap filler equipment is the satellite broadcasting service system according to claim 15 characterized by to have a means transmit towards the broadcast receiving set of the area where the message information on to that effect is generated, and self-equipment covers this message information when it is detected that abnormalities occurred in the operating state of self-equipment with a means supervise the operating state of self-equipment, and this means.
[Claim 20] In the satellite broadcasting service system which relays a broadcast signal with a satellite and is broadcast to a terrestrial predetermined service area,
Gap filler equipment which receives the broadcast signal relayed in said satellite, and carries out wireless transmission of this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area,
The receiving set for monitors with the function to receive the reception broadcast signal which was installed in said non-receipt area and transmitted from said gap filler equipment,
The supervisory equipment connected through the communication line to this receiving set for monitors is provided,
Said gap filler equipment generates the monitor information showing the operating state of self-equipment, includes this monitor information in said reception broadcast signal, and is equipped with the means which carries out wireless transmission,
Said receiving set for monitors is equipped with a means to receive the reception broadcast signal transmitted from said gap filler equipment, and to extract said monitor information from the inside, a means to detect the receive state of said reception broadcast signal, and a means to transmit said extracted monitor information and the detection information on said receive state to said supervisory equipment through said communication line,
Said supervisory equipment is a satellite broadcasting service system characterized by having a means to perform predetermined processing for receiving the monitor information and detection information which were transmitted through said communication line from said receiving set for monitors, and supervising the operating state of said gap filler equipment based on this monitor information and detection information that were received.
[Claim 21] (The equipment claim of claim 9) It is gap filler equipment used by the satellite broadcasting service system equipped with two or more broadcast receiving sets which had the satellite which transmits to a terrestrial predetermined service area after changing the broadcast signal transmitted from the ground broadcasting station into the 1st and 2nd broadcast signals with which frequencies differ mutually, and the function which receive the 1st broadcast signal relayed by said satellite in said service area, and reproduce,
A means to receive the 2nd broadcast signal transmitted from said satellite, and to change this 2nd broadcast signal

into the 3rd broadcast signal of the same frequency as said 1st broadcast signal,
Gap filler equipment characterized by providing the means which turns this 3rd broadcast signal to the area which cannot receive the 1st broadcast signal from said satellite in said service area, and carries out wireless transmission.
[Claim 22] (Equipment claim of claim 16) It is gap filler equipment which receives the broadcast signal relayed by the satellite and carries out wireless transmission of this reception broadcast signal to the non-receipt area of said broadcast signal,
Gap filler equipment characterized by providing a monitor information transmitting means to make the predetermined processing for supervising the operating state of self-equipment to supervisory equipment perform by generating the monitor information showing the operating state of self-equipment, and transmitting this monitor information to supervisory equipment through a communication line.
[Claim 23] (Equipment claim of claim 17) Said monitor information transmitting means,
A means to accumulate the generated monitor information,
Gap filler equipment according to claim 22 characterized by having a means to read said monitor information and to transmit to supervisory equipment whenever the Request to Send came from supervisory equipment.
[Claim 24] (Equipment claim of claim 18) A means to supervise the operating state of self-equipment,
Gap filler equipment according to claim 22 characterized by having a means to transmit the monitor information showing those contents to supervisory equipment through a communication line when it is detected that abnormalities occurred in the operating state of self-equipment with this means.
[Claim 25] (Equipment claim of claim 19) A means to supervise the operating state of self-equipment,
Gap filler equipment according to claim 22 characterized by having a means to transmit towards the broadcast receiving set which exists in the non-receipt area where the message information on to that effect is generated, and self-equipment covers this message information when it is detected that abnormalities occurred in the operating state of self-equipment with this means.
[Claim 26] (Approach claim of claim 16) While a satellite relays a broadcast signal and broadcasting to a terrestrial service area, it is the approach of supervising actuation of said gap filler equipment by the satellite broadcasting service system which receives the broadcast signal relayed by said satellite with gap filler equipment, and carries out wireless transmission of this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area,
The process in which said gap filler equipment carries out the monitor of the own operating state, and generates the monitor information,
The course which transmits said monitor information to supervisory equipment through a communication line from gap filler equipment,
The gap filler monitor approach characterized by providing the course which performs predetermined processing for said supervisory equipment to receive the monitor information transmitted from said gap filler equipment, and supervise the operating state of said gap filler equipment based on this received monitor information.
[Claim 27] (Approach claim of claim 20) While a satellite relays a broadcast signal and broadcasting to a terrestrial service area, it is the approach of supervising actuation of said gap filler equipment by the satellite broadcasting service system which receives the broadcast signal relayed by said satellite with gap filler equipment, and carries out wireless transmission of this reception broadcast signal to the area which cannot receive the broadcast signal from said satellite in said service area,
The course which generates the monitor information as which gap filler equipment expresses the operating state of self-equipment, includes this monitor information in said reception broadcast signal, and carries out wireless transmission,
The course which detects the receive state of said reception broadcast signal while receiving the reception broadcast signal transmitted from said gap filler equipment in the receiving set for monitors installed in said non-receipt area and extracting said monitor information from the inside,
The course which transmits said extracted monitor information and the detection information on said receive state to supervisory equipment through a communication line from said receiving set for monitors,
The gap filler monitor approach characterized by providing the course which performs predetermined processing for receiving the monitor information and detection information which were transmitted through said communication line from said receiving set for monitors in said supervisory equipment, and supervising the operating state of said gap filler equipment based on this monitor information and detection information that were received.

[Translation done.]